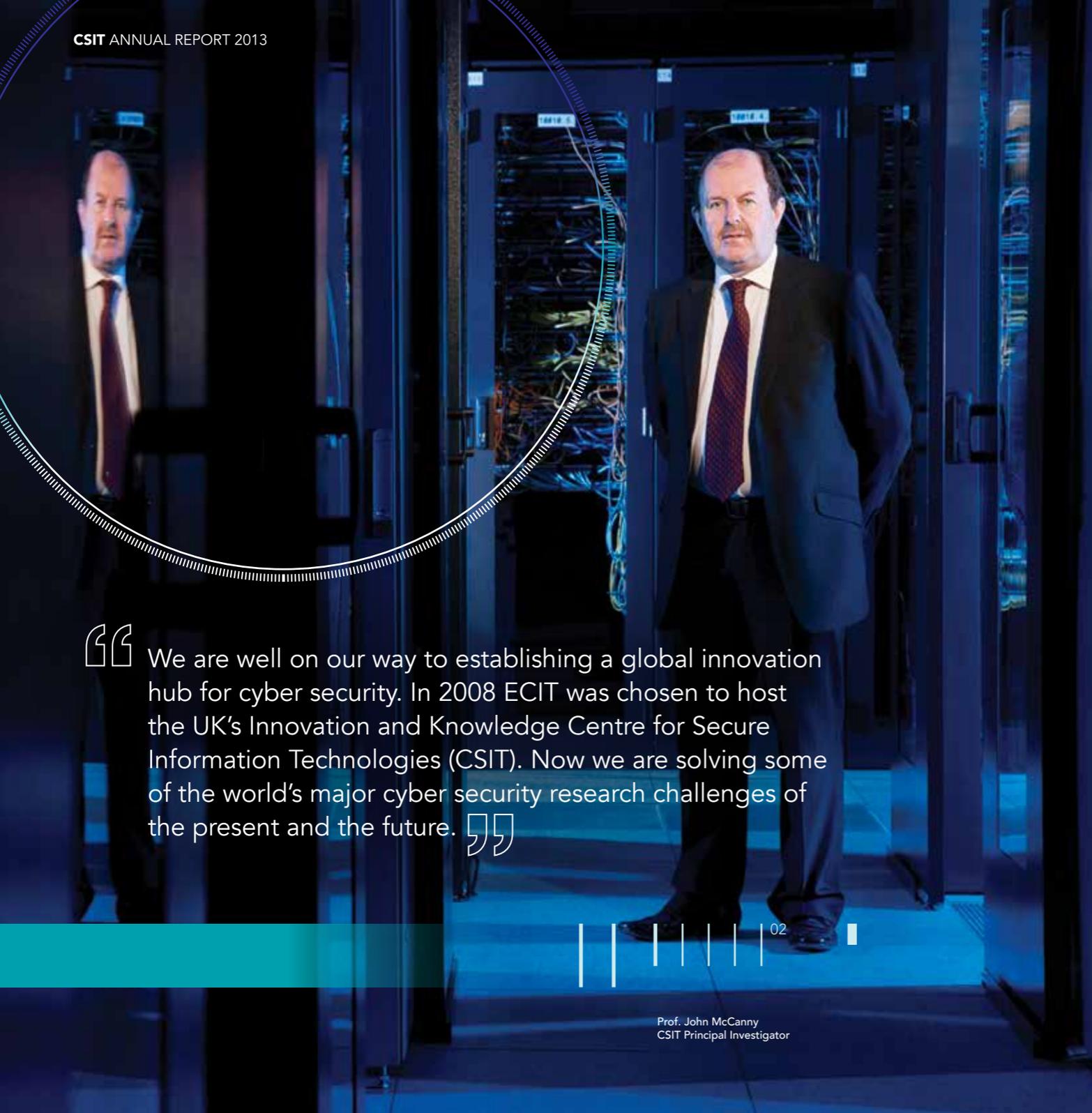


ANNUAL REPORT
2013

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ESTABLISHING
A GLOBAL
INNOVATION
HUB FOR
CYBER SECURITY



“ We are well on our way to establishing a global innovation hub for cyber security. In 2008 ECIT was chosen to host the UK’s Innovation and Knowledge Centre for Secure Information Technologies (CSIT). Now we are solving some of the world’s major cyber security research challenges of the present and the future. ”

Prof. John McCanny
CSIT Principal Investigator

MESSAGE FROM PRINCIPAL INVESTIGATOR

PROF. JOHN MCCANNY, CBE FRS FRENG MRIA,
DIRECTOR INSTITUTE ELECTRONICS COMMUNICATIONS
AND INFORMATION TECHNOLOGY (ECIT)

In 2008 the Institute of Electronics, Communications and Information Technology was chosen to host one of only seven UK Innovation and Knowledge Centres (IKCs). Funded by EPSRC and Technology Strategy Board, IKCs are a key component of the UK’s approach to the commercialisation of emerging technologies through creating early stage critical mass in an area of disruptive technology. Through our Centre for Secure Information Technologies (CSIT), leveraging additional support from Invest Northern Ireland, we are achieving this through our world class research, new value and venture creation and entrepreneurial approach in the area of cyber security.

This unique environment encourages collaboration among academics, researchers, engineers, industry and government to accelerate the results of cyber and physical security research through to commercial application.

Traditionally, universities have researchers and PhD students on three-year contracts and they end up leaving when things are getting to a crucial point. At CSIT we have created a new type of contract, based on the hi-tech business model, to employ engineering and business development staff with extensive industry experience.

Based at the Northern Ireland Science Park, in Titanic Quarter, Belfast, this flagship Centre has helped in the attraction of over 100 high-tech Foreign Direct Investment (FDI) and start-up companies. These companies employ more than 2,000 people and is evidence of the wider economic benefits to be gained from translating science into wider business and economic opportunity.

The approach adopted within CSIT contrasts with the more conventional way academic research is undertaken. Our starting points tend to be larger “mission-driven” projects involving sizeable teams for which ambitious and challenging end goals have been identified.

Multinational partners include Altera, BAE Systems, Cisco, Infosys, IBM, Intel/McAfee, Roke and Thales, whilst recent spin outs such as Titan IC Systems and MicroSense will seek to emulate the success of earlier spin-out companies including Amphion Semiconductor Ltd. and Audio Processing Technology Ltd. It is fitting that just a few yards away is the dry dock where Titanic was built. The innovative engineering skills of yesterday have given way to those of the future.

Attracting new commercial partners to work with us on these new technologies is fostering international collaboration with leading Institutes in the USA, South Korea, India and Europe. International issues require international solutions and this global innovation hub at CSIT has a unique approach in facilitating speculative blue skies and industrial informed research projects within the same Institute.

We are solving some of the world’s cyber security research challenges of the present and the future. I hope you can collaborate with us to ensure our research is of the highest international quality and, where appropriate, market informed, leading to successful economic impact. Our objective is to make a difference in securing our digital services, infrastructure and frontiers for many years to come.

Professor John McCanny is a Fellow of the Royal Society, the Royal Academy of Engineering and the Institute of Electrical and Electronic Engineers (IEEE). His awards include the IET’s Faraday Medal, an IEEE Millennium Medal and the Royal Irish Academy’s Cunningham Medal. He co-founded two successful high technology companies based the work of his research teams, Amphion Semiconductor Ltd. (acquired by Conexant, later NXP) and Audio Processing Technology Ltd. (acquired by Cambridge Silicon Radio).

EST.09

BASED IN THE ECIT INSTITUTE
QUEEN'S UNIVERSITY BELFAST

INITIAL FUNDING OVER £30M

> £30M

80

STAFF MADE UP OF
ACADEMICS, RESEARCHERS,
ENGINEERS AND
BUSINESS DEVELOPMENT

UK'S INNOVATION
AND KNOWLEDGE
CENTRE FOR
CYBER SECURITY
TECHNOLOGY
RESEARCH

LEADERSHIP

CSIT's Open Innovation Model involves partner companies committing to inform CSIT research roadmaps and access CSIT technology to evaluate for exploitation. Member Companies and government stakeholders have access to direct, absorb and bring to market over £30Ms worth of research in their specific sector.

Full member Companies each obtain a seat on the CSIT board and voting rights to steer and direct the research. Government stakeholders (DSTL, GCHQ, CPNI, CAST and PSNI) also have a seat on the board as well as funding agencies.

CSIT's Model provides centralised and aggregated market intelligence, including access to articulated problem statements, a deeper knowledge of trends and opportunities and access to problem-owners, customers and end users. It also provides an ability to build strategic alliances with industry, government and academia, and a platform to showcase capabilities to the wider national and international community.

Industrial Advisory Board Members

- Phil Sutton, CHAIRMAN
- Altera representative
- Colin Kerry, BAE Systems
- Barbara Fraser, Cisco
- Chris Meenan, IBM
- Subu Goparaju, Infosys
- Raj Samani, McAfee
- Pete Lockhart, Roke
- Chris Firth, Thales

Associates

Operating on a rotational basis, one Associate Member company represents the group at each CSIT board meeting:

- Aetopia
- Titan IC Systems
- Netronome
- Qosmos
- Repknight
- Seven Technologies
- Tyco
- Replify
- Relay Systems
- Kybeire
- AirPOS



OUR VISION

Our vision is to be a global innovation hub for cyber security, this means that CSIT will accelerate new value creation, drive new venture creation and build capacity for the cyber security industry.

We define Innovation as new value creation that leads to competitive advantage.

New value created is transferred to member companies, associates and partners through licensing, contract research, knowledge transfer programmes and also through the creation of new ventures.

In creating a hub CSIT is building capacity. A global brand recognised as a 'go-to' place for innovation and collaborative research, active in Horizon 2020 and other international research programmes, we support UK industry in consortia and co-tendering for opportunities.

For SMEs, CSIT will continue to support their winning of new business due to the ability to out-source expertise and design service consultancy. As well as building capacity that organisations can avail of, CSIT will continue to strongly support the challenge of a shortage of expertise and aptly skilled personnel by 'spill-over' of staff and PhD graduates moving into new employment as future leaders in the global cyber security industry.



OUR STRATEGY

The single overarching principle behind our research roadmap is that we are **Securing our digital tomorrow.**

This broad theme has secure networks as an integral component, but is broken into three core areas of activity:

- **Securing Digital Assets:** The distributed and networked nature of computing and storing digital assets in the Cloud requires context-specific security technologies. CSIT is channelling research and innovation into protecting assets, content and infrastructure from malicious attack or unintentional exposure. With pervasive computing, personal information will be used to optimise Smart Utilities and Smart Cities. We are therefore researching policies on privacy and ethics, technologies to prevent misuse of collected data and the opportunity for, and viability of, data shredding in the Cloud and the right to be forgotten.
- **Securing Digital Devices:** In the hyper-connected world of the Internet of Things (IoT) there is significant security risk from loss of sensitive information on sensors and devices. Furthermore, with increasing communication channels there is an increased attack surface, so we are researching security protocol vulnerabilities and side channel attack and countermeasures. Research and innovation is also directed into Device Authentication, novel biometrics for access control, multi-factor authentication, hardware Trojan detection/prevention, novel approaches to mobile malware, secure virtualisation environments for Bring Your Own Device (BYOD) and robust Physical Unclonable Function (PUF) designs.
- **Securing Digital Citizens:** With a pervasive computing landscape, people will be empowered within an active space that is aware of their presence, ubiquitous, sensitive, adaptive and responsive to their capabilities, needs, habits and emotions. CSIT is driving research and innovation into this area to provide secure active spaces that will encompass; social sensing and analytics, context aware data analytics and participatory sensing. This will use 'smart' data to provide a 'next best action' suggestion allowing the citizen to securely go where they want and engage with who they want, in the digital tomorrow.

CSIT uses the expertise within its different research clusters to assist in the provision of novel technologies for these core areas of activity.

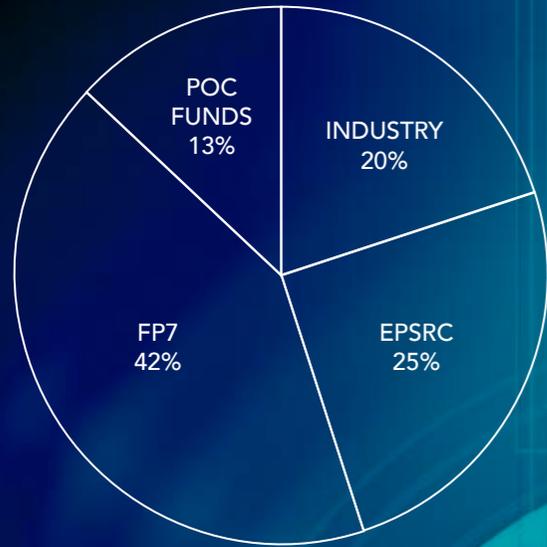
Our work is industry informed via our Open Innovation Model where Member companies and Associates help shape research roadmaps. With CSIT's unique environment and team we will accelerate delivery of new value back to Members and other stakeholders.

Key to the strategy of CSIT is our innovation conduits. A permanent group of engineering staff that sit alongside the academic researchers and assist with knowledge transfer, articulating capability, producing rapid prototyping and understanding the language and drivers of industry.

Commercialisation of research is via consultancy, collaborative partnerships, IP licensing and also through the creation of new ventures. CSIT will continue to nurture and facilitate spin-out company creation. CSIT will continue to support UKTI and Invest NI in attracting new businesses to the UK in the form of foreign direct investment (FDI).



BREAKDOWN OF
ADDITIONAL RESEARCH
BUSINESS WON SINCE 2009

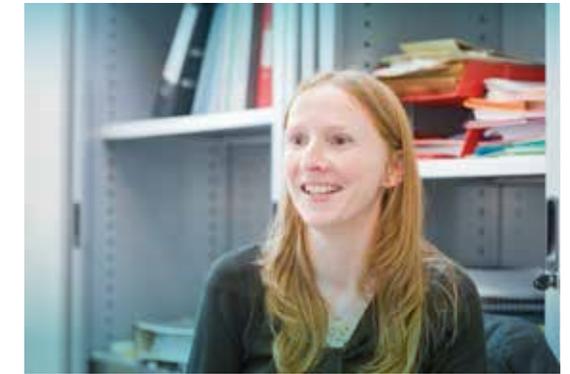


TOTAL ADDITIONAL
FUNDING: £6.59M

OVER 150 RESEARCH PUBLICATIONS

CO-TENDERING AND 4 KTPs
STRONG SME CAPACITY SUPPORT WITH CONTRACT RESEARCH

INNOVATION THE RESEARCH GROUPS



Professor Máire O'Neill

Data Security Systems

This research group is led by Professor Máire O'Neill who was still a PhD student when her research was first exploited commercially. Regarded as one of Europe's leading cryptography experts she holds a 5-year £1.45M EPSRC Leadership Fellowship and is a former holder of a Royal Academy of Engineering research fellowship. Máire has received numerous awards for her research which include British Female Inventor of the Year 2007.

She has authored a research book on symmetric-key cryptographic architectures and has over 100 peer-reviewed conference and journal publications. She was technical co-chair of the Workshop on Embedded Systems Security in 2012. She was guest editor of the launch issue of IET Information Security in 2005 and is currently an Editorial Board member for the International Journal of Reconfigurable Computing.

Professor O'Neill has given numerous invited talks and has been a technical program committee member for many international conferences, including DAC, CHES, DATE, SOCC, ISCAS and RFIDSec. She is an IEEE Circuits & Systems for Communications (CASCOM) Technical committee member and was treasurer of the Executive Committee of the IEEE UKRI Section, 2008-09. She is a fellow of the HEA, a senior member of the IEEE and a member of the IET and IACR.

Her research group's expertise lies in the area of information security and more specifically in high-speed and low-cost security architectures, lightweight authentication protocols, applied homomorphic encryption, physical unclonable functions (PUFs) and in securing cryptographic devices from side channel attacks. CSIT's novel PUF technology is currently being integrated into a secure electric vehicle (EV) infrastructure in order to detect cloned or tampered devices.

Her group currently carries out research and innovation in the following technologies:

- Cryptographic algorithms:** Highly Optimised, Low Power
- Side Channel Attacks:** Power, EM analysis, Countermeasures
- Physical Unclonable Functions:** Unclonable RFID tags, Security infrastructure for EV charging



Professor Sakir Sezer

Network Security Systems

This research group is led by Professor Sakir Sezer. After completing his primary degree at RWTH Aachen University in Germany, Turkish-born Sezer first discovered his passion for designing hardware-based network processing following a student exchange programme with Queen's University and subsequent employment with QUB spinout Amphion Semiconductor in the development of ASICs for access and high-speed transmission products.

Professor Sezer's research is leading major (patented) advances in the field of high-performance content and security processing and is currently commercialised by Titan IC Systems. He has co-authored over 130 conference and journal papers in the area of high-performance network, content processing and System on Chip. For his achievements Professor Sezer has been awarded a number of prestigious awards including the

InvestNI Enterprise Fellowship, and Enterprise Ireland and InterTrade Ireland innovation and enterprise awards. Professor Sezer is also co-founder and CTO of Titan IC Systems and is a member of various research and executive committees.

Research group focus and innovations:

Network Security: IDS / IPS, DDoS detection, mitigation, Insider threat

Cloud Security: External infrastructure attack, Attack within infrastructure, Information leakage

SCADA & Smart Grid Security: Customised instruction, DDoS detection, mitigation

Malware Analysis: Zero day attacks, Reverse engineering, Signature extraction



Professor Vincent F Fusco

Wireless Enabled Security Systems

This research group is led by Professor Vincent F Fusco who straddles the worlds of business and academia. Awarded the Mountbatten Medal in 2012 for outstanding, dedicated, lifetime leadership in establishing the field of active antenna technology for advanced wireless application. He is also a co-founder of the successful university spin-out companies LamhRoe and Microsense.

He obtained his PhD and DSc in Microwave Electronics from the Queen's University of Belfast, where since 1996 he has held a personal chair in High Frequency Electronic Engineering. Professor Fusco's research interests include active antenna and front-end MMIC techniques. He is head of the High Frequency Laboratories at QUB.

Professor Fusco has published over 400 scientific papers in major journals and over 280 international conferences papers. He has authored two text books, holds patents relating to self-tracking antennas and has contributed invited papers and book chapters. He serves on the technical programme committee for various international conferences including the European Microwave Conference.

He is a Fellow of both the Institution of Engineering and Technology and the Institute of Electrical and Electronic Engineers. In addition, he is a Fellow of the Royal Academy of Engineering and a member of the Royal Irish Academy. Research group focus and innovations:

- Retro-directive Antenna Spatial Encryption
- Liquid Crystal Controlled Scanning
- Phased Array for Remote Sensing
- Secure communication with directional modulation scheme
- FSS Filters for sub-terahertz
- Stealth absorbers
- Body Area Networks



Dr Paul Miller

Intelligent Surveillance Systems

Dr Paul Miller is Research Director of the Intelligent Surveillance Systems group. He has published over eighty papers in image and video analysis, including a best paper award for his work on object recognition.

Previously, he worked as a senior research scientist at the Defence, Science and Technology Organisation, Australia where he led a team providing science and technology advice on unmanned aerial surveillance systems. Before that he worked as a research fellow at QUB.

He received his PhD in Optical Image Processing from QUB in 1989. Since returning to academia he has continued to work in video analytics for both defence and civilian CCTV applications, and also bio-medical image analysis. His research interests include image restoration, segmentation, multi-camera tracking and gender/age profiling of subjects in video.

More recently, his main research interest has been in the convergence of cyber and physical security. He has been investigating graph-based data mining approaches that identify anomalous behaviour using both physical

and network sensor data. He is also investigating the use of uncertainty reasoning for enhanced situation awareness across both the physical and cyber space of enterprises. During his academic career he has constantly worked in close collaboration with industry, including both multinational and SME companies.

Research group focus and innovations:

- Person Tracking in 3D:** Combined RFID & video, Learning models, optimised for online person verification
- Event Recognition, Search & Retrieval:** Unique datasets, Finite state machine approach, Event mining
- Event Management Platform:** Multiple sources, Fusion algorithms, Evidential Reasoning, Multi-agent system combining abnormal event detection from different agents

EPSRC AND GCHQ APPROVED ACADEMIC CENTRE OF EXCELLENCE IN CYBER SECURITY RESEARCH

INTERNATIONAL STANDARDS INVOLVEMENT

ITU – INTERNATIONAL TELECOMMUNICATIONS UNION – MEMBER OF THE UK DELEGATION TO STUDY GROUP 17 (SECURITY)

ETSI – EUROPEAN TELECOMMUNICATIONS STANDARDS INSTITUTE – FULL MEMBER

CSIT HOST THE 'CYBER 100' AT THE ANNUAL WORLD CYBER SECURITY TECHNOLOGY RESEARCH SUMMIT



INNOVATION THE PROJECTS

Complementing our core research and direct industry engagements, CSIT is a powerhouse of national and internationally funded collaborative projects. Projects include:

HANDHOLD – FP7

HANDHOLD (HANDHeld OLfactory Detector) is a European FP7 funded security project, co-ordinated by CSIT, to develop a modular, reconfigurable sensor system for active stand-off deployment for the detection of chemical (C), biological (B), radiological (R), nuclear (N) and explosive (E) (CBRNE) substances. ECIT Institute spin-out company Analytics Engines are also a consortia member.



PRECYSE – FP7

PRECYSE (Prevention, protection and REaction to CYber attacksS to critical infrastructures) is a European FP7 funded project which will define, develop and validate a methodology, architecture and a set of technologies and tools to improve by design the security, reliability and resilience of the ICT systems supporting the Critical Infrastructures (CI).



NIMBUS – EPSRC

Network in Internet and Mobile Malicious Software (NIMBUS) is an Engineering and Physical Sciences Research Council (EPSRC) funded project which will act as a catalyst to develop a balanced programme of both blue skies research and near term applied research to assist in the fight against cybercrime in the UK.



PACES – EPSRC

PACES (Providing Autonomous Capabilities for Evolving SCADA) is an EPSRC funded research project which will exploit new Deep Packet Inspection capabilities and network traffic analysis to develop a unique 'cyber-sensor', providing visibility of overall system health and integrity to human operators and autonomous components.



ARIES – EPSRC

ARIES (Accelerated Real-Time Information Extraction System) is an EPSRC funded research project to investigate a new generation of data and memory centric parallel processing architectures and data mining algorithms optimised for mining very large, diverse and highly distributed data assets.



LIOPA – SBRI

Liopa (Lip verification & Online Person Authentication) is a novel mobile biometric authentication and speaker verification application, service and API. The Liopa team has successfully secured and delivered a Small Business Research Initiative (SBRI) project for the Technology Strategy Board's "Preventing Fraud in m-Commerce" call and won the software and digital category at the 2013 NISP Connect 25K Awards for the most innovative publicly funded research and IP.



INNOVATION THE TECHNOLOGY

1. PUF: Physical Unclonable Functions

A PUF is a cryptographic function that generates a unique identity for a device. PUFs are the next generation of anti-counterfeiting and secure M2M authentication technology. CSIT's PUF technology is currently **UK Patent Pending** - (No. 1220574.6, 15 Nov 2012) and is now being integrated in an M2M deployment in Korea by LG-CNS.

2. SCA: Side-Channel Analysis

Side Channel Attacks reveal the security key stored in electronic cryptographic devices by monitoring physical characteristics rather than using brute force attacks to break algorithms. CSIT were the **first to show successful Power Analysis attacks** against the SHACAL-2, Camellia and CAST-128 encryption algorithms. We have developed a measurement platform for EM & Power analysis as well as new attack techniques and lightweight Differential Power Analysis (DPA) countermeasures.

3. FHE: Hardware Implementation of Fully Homomorphic Encryption

Homomorphic encryption enables computations to be performed on encrypted data. Fully homomorphic encryption (FHE) schemes allow unlimited additions and multiplications. CSIT have completed the **first hardware implementation** of the entire encryption step of an integer based FHE scheme using a super-size Fast Fourier Transform (FFT) multiplier and Barrett Reduction design on a Xilinx Vertex 7 FPGA device. Synthesis results show a **speed up of up to 54** over software implementations.

4. ASP: Autonomous Surveillance Platform

CSIT's ASP contains a **suite of analytic modules developed to exploit video and RFID data** to elicit rich person-specific surveillance observations from a scene. Observations include subject, age and gender, facial models, RFID signatures, clothing colour signatures, 3D trajectory tracks and posture classification. ASP has been developed for security applications in transport corridors however the core capabilities readily transfer to applications in other spaces.

5. ERF: Evidential Reasoning Framework

The Evidential Reasoning Framework (ERF) is an agent-based solution based upon artificial intelligence models to reason across a cyber-physical environment. CSIT's ERF is **the most advanced decision support solution available that can robustly handle uncertainty in the modern security surveillance domain.**

6. ITACA: Internet and Traffic Content Analysis

ITACA is a **platform for real-time analysis of IP network traffic**. ITACA enables the creation of sophisticated security analysis systems using modular plug-in functions implemented in software and/or FPGA. Plug-ins use well defined C++ API to interact with the ITACA core system.

7. SCADA IDS: SCADA Intrusion Detection System

CSIT has developed key components for intrusion detection in SCADA based industrial control systems and critical infrastructures. These include a SCADA protocol-specific signature detection rule-set compatible with Snort and stateful protocol analysis. The SCADA IDS is **built upon ITACA and performs advanced stateful traffic analysis without affecting performance or latency** of the underlying SCADA control system.

8. AMD: Automated, High-Fidelity, Android Malware Detection

CSIT has developed an **Android malware detection strategy based on automated static analysis** of Android application packages. The strategy combines lightweight analysis of permissions information held in the manifest file along with detailed analysis of the application's use of critical APIs and system services. The resulting classifier is over 92% accurate in identifying Android malware.

9. SDN: High Performance Flow Based Management of SDN nodes

CSIT is leading a community effort to crack low-cost, **hardware accelerated SDN capability**. Harvesting intelligence from existing IPS, IDS, DPI and other techniques followed by analysis and centralized reprogramming of the network, as required, can render the SDN network more robust to malicious attack than traditional networks. CSIT's SDN technology and expertise will enable this movement.

10. LIOPA: Lip Verification & Online Person Authentication

Liopa is a novel **mobile biometric authentication** and speaker verification application, service and application programming interface (API). Liopa has successfully secured and delivered a Small Business Research Initiative (SBRI) project for the Technology Strategy Board's Preventing Fraud in m-Commerce call and won the software and digital category at the 2013 NISP Connect 25K Awards for the most innovative publicly funded research and IP.

COLLABORATION THE TEAM

CSIT differs from most other University research Centres because we employ unique engineering and commercialisation teams which operate as a permanent staff to assist in the acceleration of research to market, bridging any gaps to exploitation.

CSIT Director

Dr Godfrey Gaston

Godfrey has responsibility for general operations, business development, marketing, financial management and commercialisation of the research through licensing and spin out company formation. He has a PhD in Semiconductor technology, worked as a Principal Engineer for GEC Plessey Semiconductors before joining the senior management team of BCO, a successful silicon wafer bonding start-up. Dr Gaston has an MBA from Henley Management College.



The Commercial Team

Mr. Stephen Wray, Commercial Director

15 years' IP Commercialisation experience with significant international technology licensing, negotiating, business development and marketing expertise. Previous roles include Global IP Business Manager at Amphion and VP Licensing at APTX. He is a graduate of the University of Edinburgh with an Honours degree in Electrical and Electronic Engineering.

Mr. Philip Mills, Business Development Manager

Over 10 years' experience building collaborative relationships with clients and partners in the commercial software domain, including software licensing, consultancy, business development and marketing. Previously held business development and sales roles at Singularity, AePONA, APiON and Aldiscon. Philip holds a Masters in Mechanical & Manufacturing Engineering from Queens University, and a Masters in Computer Science from Queens University in collaboration with the University of Las Palmas, Gran Canaria.

Mr. David Crozier, Technical Marketing Manager

Over 12 years' experience in the public and private sectors in technical, policy and operational roles. David joins CSIT from Invest NI. Previously he held product management and pre-sales roles at Lagan Technologies and policy advisor and system engineering roles at the NIO. David holds a Masters in Innovation & Entrepreneurship and an Honours degree in Computer Science, both from the University of Ulster.

Senior Engineering Managers

Dr. Michael Loughlin, Senior Engineering Manager

He has over 15 years' experience designing and developing enterprise software solutions for the utility, telecoms and financial sectors. He has led software development teams in start-ups and multi-nationals and has commercialised academic research in speech recognition and network management.

Mr. Gavin McWilliams, Senior Engineering Manager

A veteran technologist of the telecoms industry and mobile internet sectors with a distinguished career in software product development spanning 3 decades. He held senior management positions in Mobile Cohesion, Openwave Systems, Nortel Networks and BT's Research and Development division. He has broad experience of core Internet infrastructure, data communications, professional software development, and project delivery.

EDUCATION PhD STUDENTSHIPS



CSIT is part of Queen's University Belfast's School of Electronics, Electrical Engineering and Computer Science. Queen's is among the top universities in the UK for these disciplines for both research and teaching. As a result, the School currently attracts staff and students from over 70 countries worldwide.

It is a member of the Russell Group, a select band of the top 20 UK research-intensive academic institutions and is the 9th oldest university in the UK. The University's proud academic tradition stretches back over 160 years and today its influence far transcends its geographical location.

PhD sponsorship options are available to member companies to enable them to supervise and direct research projects. This can take the form of student top-up grants, industrial supervision or student placements.

- Over 150 research publications since CSIT was established in 2009
- 9 CSIT PhD graduates: Kean Hong Boey, Weiqiang Li, Xiaolin Cao, Antonio Munoz, Benoit Dupasquier, (2012), Sandra Scott-Hayward, Philip Hodggers, Yongsheng Wang, Yi Yang (2013).
- 26 CSIT PhD graduates in the pipeline: Phil O'Kane, Colin Burgess, Kevin McAreavey, Michael Davis, Kasim Tasdemir Sriram Varadarajan, William Cully (2013). Keissy Guerra Perez, Jennifer Betts, Stefan Popa, Sriram Varadarajan,
- 5 Capital Mkt studentships (2014): Chonyan Gu, (2015), Matthew Hagan (2016), J Howe, R Gilmore, J Bentham, R McConville, J Gaston, E Shorten, P Maynard, A Hanna, (2017)
- 8 new entrants onto our CSIT PhD programme in September 2013

Examples of current and previous students include:

Colin Burgess (UK) - Detection of packed executables to reveal hidden malware

"I'm researching more efficient and accurate techniques to detect packed executable files which contain hidden content. This is the form in which most malware / viruses are found on a computer (~90%), so if we find a packed file there is a high chance we find a virus. The faster we can do this, the more viruses we can catch"

Philip O'Kane (UK) - Analysis and detection of malware

"I am looking at ways of detecting malware as it runs on a PC. Modern malware has become so sophisticated (obfuscated/hidden) that they can avoid detection. The new methods derived from this research will hopefully detect new instances of highly obfuscated malware."

MSc IN CYBER SECURITY

We are launching a new MSc in Cyber Security for September 2014 enrolment which aims to address the shortage of cyber security professionals both in the UK and globally. The emphasis of the MSc is to provide graduates with a comprehensive understanding of the cyber security challenges facing industry and society today and in the future, and equipping them with the skills necessary to address those challenges.

A key differentiator of our MSc in Cyber Security programme is the opportunity to closely engage with CSIT industry partners. This includes the facilitation of industrial internships with leading security professionals, as well other commercially specified and co-supervised projects. Invited seminars and special guest lectures from influential industry and academic leaders offer students a chance to engage with those at the pinnacle of the cyber security profession.

Further information available at www.csit.qub.ac.uk/msc

EDUCATION WORLD CYBER SECURITY TECHNOLOGY SUMMIT

CSIT's World Cyber Security Technology Research Summit brings together global representatives of government, academia and industry to discuss the current state of cyber security technology, horizon scan, establish agreed priorities for research activities and articulate the impact resulting technologies have had on the global fight against cyber-crime and cyber-terrorism. Dubbed the 'Davos' of the Cyber Security industry, the summit is an invite only event which takes place over the two day period leading up to St Patrick's Day each March in Belfast.

The summit is cyclical, following a three year cycle of Horizon/Roadmap/Impact. Belfast 2013 focused on Impact, showcasing international research from Academia and Industry informed by Belfast 2012 and the four defined research roadmaps (Adaptive Cyber Security Technologies | Protection of Smart Utility Grids | Security of the Mobile Platform and Applications | Multi-faceted Cyber Security Research).

Keynote presentations from government and industry leaders gave perspective and context to break-out sessions where roadmap elements were debated between researchers, policy makers, industry and practitioners. The keynotes addressed; a partnership approach to tackling cyber-crime, government policies and initiatives, industry challenges/opportunities, on-going strategic research and the future cyber security landscape.

The goals associated with the World Cyber Security Technology Summit are:

- To connect global experts in the field of cyber security from leading research institutes, government bodies and industry
- To act as a forum for the cross pollination of ideas and concepts from these experts to stimulate novel approaches to researching and solving cyber security challenges of the future

- To elevate the concept of information and cyber security in the minds of policy makers to stimulate greater investment in research and development in this field
- To showcase research and technological advances in the field of cyber security at CSIT
- To expose the next generation of information and cyber security leaders, researchers and engineers based at CSIT to key thinkers and industry leaders in this field

CSIT hosted the "Cyber 100" during Belfast 2013: The third 'World Cyber Security Technology Summit'. They included Raj Samani, CTO, EMEA, McAfee, Mr Colin Whittaker, VP Payment Systems Risk, Visa Europe, Mr Timo Skytta, Senior Director, Consumer Services, Nokia, Mr Hugh Eaton, OBE, MA National Security Director, Cisco, Dr Ulf Lindqvist, Program Director, SRI International, Dr Patrick Traynor, Associate Professor, Georgia Institute of Technology and Professor Virgil Gligor, Director, Cylab.

Previous Summits have hosted Professor Bernard Silverman, chief scientific advisor, UK Home Office, Dr Douglas Maughan, cyber security division director, US Homeland Security, Eugene Kaspersky, chairman and CEO, Kaspersky Labs, Barbara Fraser, director, innovation, connected energy networks, Cisco and other high profile industry and thought leaders.

The Belfast 2013 Summit Report and other collateral can be viewed at www.csit.qub.ac.uk/belfast2013

3 NEW VENTURES HAVE BEEN CREATED: – TITAN IC SYSTEMS, MICROSENSE AND ACTIV WIRELESS

9 PhD graduates and 26 PhD students currently in residence



SHORTLISTED FOR SC
MAGAZINE INFORMATION
SECURITY CONSULTANCY
OF THE YEAR 2013

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The Centre for Secure Information Technologies (CSIT) is the UK's Innovation and Knowledge Centre for cyber security technology research and is based at Queen's University of Belfast's ECIT Institute.

CSIT brings together research specialists in data encryption, networking, wireless security and intelligent surveillance who are establishing a global innovation hub for cyber security. This means that CSIT will accelerate new value creation, drive new venture creation and build capacity for the cyber security industry. Operating an Open Innovation Model to drive collaboration partners include Altera, BAE Systems, Cisco, IBM, Infosys, Intel/McAfee, Roke, Thales, numerous SMEs, spin-out ventures and leading institutes in USA, South Korea, India and Europe.